

North Platte. *Nevada*: 55° at Pioche. *New Hampshire*: 42° at \*Contoocookville and 31° on summit of Mount Washington. *New Jersey*: 55° at Cape May. *New Mexico*: 72° at La Mesilla. *New York*: 56° at \*Ft. Niagara and 53° at Rochester. *North Carolina*: 77° at Wilmington. *Ohio*: 66° at \*Portsmouth and 60° at Cleveland and Cincinnati. *Oregon*: 65° at Roseburg. *Pennsylvania*: 69° at Pittsburgh. *Rhode Island*: 50° at Newport. *South Carolina*: 73° at Charleston. *Tennessee*: 71° at Memphis. *Texas*: 94° at \*Ft. Ringgold and 88° at Rio Grande City. *Utah*: 49° at Salt Lake City. *Vermont*: 43° at \*Windsor and \*Woodstock, and 41° at Burlington. *Virginia*: 71° at Cape Henry. *Washington Territory*: 60° at \*Bainbridge Island and 51° at Olympia. *West Virginia*: 67° at Morgantown. *Wisconsin*: 44° at Milwaukee. *Wyoming*: 60° at Cheyenne.

Those marked with a star (\*) are reported by U. S. Army Post Surgeons or Voluntary Observers.

*Minimum Temperatures.*—*Alabama*: 4° at \*Green Springs and 8° at Montgomery. *Arizona*: 11° at Apache and Prescott. *Arkansas*: 0° at \*Mt. Ida and 6° at Little Rock. *California*: 25° at Campo. *Colorado*: 21° at \*Ft. Collins and —15° on summit of Pike's Peak. *Connecticut*: —10° at \*Mystic and —4° at New Haven. *Dakota*: —45° at \*Ft. Stevenson and —38° at Ft. Buford. *Delaware*: 1° at Delaware Breakwater. *District of Columbia*: —13° at Washington; \*Distributing Reservoir, —15°. *Florida*: 17° at Pensacola. *Georgia*: —8° at \*Milledgeville and 1° at Atlanta. *Iowa*: —25° at \*Cresco and —19° at Dubuque. *Idaho*: 8° at \*Ft. Hall and 19° at Boise City. *Illinois*: —25° at \*Sterling and —19° at Champaign. *Indiana*: —19° at \*Wabash and —18° at Logansport. *Indian Territory*: —3° at Ft. Gibson. *Kansas*: —22° at \*Topeka and —14° at Leavenworth and Dodge City. *Kentucky*: —7° at Louisville. *Louisiana*: 10° at Shreveport. *Maine*: —11° at \*Gardiner and —1° at Portland. *Maryland*: —19° at \*Emmitsburg and —3° at Baltimore. *Massachusetts*: —10° at \*Rowe and \*South Lee, and —7° at Thatcher's Island. *Michigan*: —23° at Escanaba. *Minnesota*: —42° at St. Vincent. *Mississippi*: 11° at \*Fayette and 12° at Vicksburg. *Missouri*: —24° at \*Sedalia and —15° at St. Louis. *Montana*: —59° at Ft. Benton. *Nebraska*: —26° at North Platte. *Nevada*: 12° at Pioche. *New Hampshire*: —28° on summit of Mt. Washington and —10° at \*Grafton. *New Jersey*: —18° at \*Linden and —7° at Atlantic City and Barnegat. *New Mexico*: —4° at \*Ft. Union and —3° at Santa Fe. *New York*: —30° at \*Madison Barracks and —9° at Buffalo. *North Carolina*: —16° at \*Lenoir and —5° at Charlotte. *Ohio*: —16° at \*Westerville and \*Jacksonburg, and —13° at Sandusky. *Oregon*: 18° at \*Eola and 19° at Portland. *Pennsylvania*: —19° at \*Dyberry and —9° at Pittsburgh. *Rhode Island*: 2° at Newport. *South Carolina*: 3° at \*Aiken and 13° at Charleston. *Tennessee*: —5° at Knoxville. *Texas*: —3° at Ft. Elliott. *Utah*: 15° at \*Ft. Douglass and 17° at Salt Lake City. *Vermont*: —19° at \*Woodstock and —7° at Burlington. *Virginia*: —34° at \*Dover and —11° at Ft. Whipple. *Washington Territory*: 20° at Olympia. *West Virginia*: —21° at \*Flemington and —9° at Morgantown. *Wisconsin*: —35° at \*Embarrass and —25° at La Crosse. *Wyoming*: —31° at \*Ft. Washakie and —24° at Cheyenne.

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*Ranges of Temperature at Signal Service Stations.*—*Monthly Ranges*, in general varied from 57° to 75° over the country east of the Rocky Mountains. Ranges less than 50° occurred only in New England, southern Florida and on the Pacific slope. The smallest ranges were: San Francisco, 19°, on the Pacific slope; Key West, 31°; Eastport and Punta Rassa, 42°, east of the Rocky Mountains. Ranges exceeding 80° were: Cheyenne, Ft. Buford and North Platte, 84°; Ft. Elliott, Tex., 86°; Helena, 91°; Ft. Assinboine, 95°; Ft. Shaw, 96°; Ft. Custer, 102° and Ft. Benton, 117°. The *daily ranges* varied generally as follows: in New York, New England and the Middle States from 19° to 24°; in the South Atlantic and Gulf States (except northwestern Texas) and in Tennessee from 24° to 31°, in the remaining districts east of the Rocky Mountains from 32° to 42°; on the Pacific coast from 13° to 22°. The *largest ranges* were North Platte, 53°; Fort Davis, 52°; Keokuk and Milwaukee, 47°, Cheyenne, Campo, St. Louis and La Crosse, 46°. The *smallest*, San Francisco and Sacramento, 13°; Brownsville, Tex., 17°; Oswego, 18°; Key West, Wood's Holl, Cape May, Thatcher's Island and New Shoreham, 19°.

*Frost.*—Frosts were unusually frequent and severe. Those in the Gulf States from the 9th to the 12th and from the 25th to the 31st, were exceedingly severe, that of the end of the month injuring vegetation in Texas even to the mouth of the Rio Grande and on the Florida coast to near Punta Rassa. The only sections *not* visited by frost were southern Florida and the extreme southwestern portion of Arizona; certain sheltered stations in southern California also escaped it.

## PRECIPITATION.

The general distribution of rainfall (including melted snow) for December, 1880, is shown on chart No. III, from the reports of over 500 stations. The table on that chart shows the precipitation for the present month as compared with the *average*. The region of greatest rainfall included the Pacific slope northward of central California; on the Atlantic slope the rainfall was heaviest along the coast of New Jersey, Delaware and Virginia. In New England the rainfall continued deficient, except in Maine and Connecticut. The excess in the Middle States was very marked on the coast and gradually diminished towards the interior. In the South Atlantic States the rainfall was especially local. The departures from the means at various stations being: Jacksonville, —1.90 inches; Charleston, —2.48; Cape Lookout, —5.04; Kittyhawk, +0.93; Charleston, +4.52. In the Gulf

States the deficiency was general (except an excess in eastern Alabama) and well distributed, with the peculiarity, however, of an excess of 1.67 at New Orleans; over eastern Texas and western Louisiana the departures ranged from —2.83 inches at Shreveport to —3.50 at Indianola and —3.60 at Corsicana. In the Ohio valley and Tennessee the deficiency was general, with an excess at one station (Cincinnati) of 0.51 inch. In the Lake region the greatest deficiencies occurred in the neighborhood of Lake Erie and the southwest part of Lake Michigan. The deficiencies in the Upper Mississippi and Lower Missouri valleys were well distributed. Over the region of least rainfall, Kansas and Nebraska, probably not more than one-quarter of the usual amount fell. The excess on the Pacific slope amounted at San Diego to 1.80, at San Francisco to 7.64 and at Portland, Or., to 7.69 inches. At Bainbridge Island, Wash. Ter., the month's rainfall was the greatest ever recorded, (twenty years record) being 17.25 inches, which is 3.55 in. larger than that of March, 1875.

*Special Heavy Rains.*—1st, Chattanooga, 3.08 inches in the 15 hrs. preceding 5:20 a. m. 1st and 2nd, Elsworth, N. C., 5.00; Murphy, N. C., 3.00; San Francisco, 2.72; Red Bluff, 2.01; Sacramento, 2.97. 2nd and 3rd, Mt. St. Helena, Cal., 6.65. 3rd, San Geronio, Cal., 2.61 in 17 hrs. 4th, Vevay, Ind., 3.75 in 16 hrs. 4th and 5th, Lenoir, N. C., 2.00; Cincinnati, 3.27 (voluntary observer); Murphy, N. C., 1.80; Cincinnati, 3.17, of which 2.21 fell in eight hrs.; Louisville, 2.83, of which 1.63 fell in eight hrs.; Flemington, W. Va., 2.05 in 13 hrs. 5th, Elsworth, N. C., 2.00; Marietta, Ohio, 2.10. 5th and 6th, Green Springs, Ala., 2.56. 6th, Savannah, 2.80 in eight hrs. 7th, New Westminster, B. C., 4.01. 10th, Portland, Or., 1.78 in 16 hrs. 14th and 15th, San Francisco, 2.17. 15th, Los Angeles, 2.26. 15th and 16th, Mt. Washington, 2.56. 15th to 17th, San Geronio, Cal., 6.18 in 63 hrs. 16th and 17th, Savannah, 3.49. 17th, New Orleans, 2.00 in two hrs. and five minutes. 18th and 19th, Princetown, Cal., 1.79. 19th, Cedar Keys, 3.28 in six hrs. and 35 min. 19th and 20th, San Francisco, 2.46; Red Bluff, 2.93; Sacramento, 2.60; Mt. St. Helena, Cal., 5.73; Colusa, Cal., 3.17. 20th, Wilmington, 1.65. 20th and 21st, Elsworth, N. C., 2.85; Chincoteague, Va., 2.36; Kittyhawk, 3.50, of which 1.77 fell in eight hrs. 21st, Brookhaven, N. Y., 2.47; Atlantic City, 2.01, of which 1.63 fell in eight hrs. 23rd and 24th, Mt. St. Helena, Cal., 9.04. 24th and 25th, Red Bluff, 2.57; Sacramento, 2.03. 25th–30th, Ft. Stevens, Or., 9.45, of which 6.25 fell in 72 hours. 25th, Elsworth, N. C., 3.50. 26th, Cape Henry, 1.92. 28th and 29th, Murphy, N. C., 2.30. 29th, Brookhaven, N. Y., 2.00.

*Largest Monthly Rain-falls on the Pacific coast.*—*California:* Mount St. Helena, 28.91; Redding, 18.39; Colfax, 16.47; Cisco, 16.33; Calistoga, 15.83; Emigrant Gap, 15.38; Ft. Gaston, 14.77; Tennant, 14.43; Auburn, 13.91; Alta, 13.80; Red Bluff, 12.85; Santa Cruz, 12.59; Oakland, 12.57; San Francisco and Gilroy, 12.33; Angel Island, 12.06; Sacramento, 11.81; Alcatraz, 11.80; San Mateo, 11.37; Suisan, 10.80; South Vallejo, 10.71; Pleasanton, 10.61; Oroville, 10.59; Davis, 10.47; San Geronio, 10.27; Dunnigan, 10.23. *Washington Tg.:* Neah Bay, 23.22; Bainbridge Island, 17.25; Olympia, 16.66; Ft. Canby, 13.54; *Oregon:* Ft. Stevens, 21.27; Portland, 13.93; Eola, 11.50; Albany, 10.00. *British Columbia:* New Westminster, 12.12 (25 days); Victoria, 11.98. Elsewhere they were: Elsworth, N. C., 13.00; Cape May, 9.21; Green Springs, Ala., 8.28; Barnegat, 8.20; Forsyth, Ga., 7.61; Brookhaven, N. Y., 7.56; Vineland, N. J., 7.52. The *smallest* were: Fort Collins, Col., 0.01; Fort Wallace, Kan., 0.02; Dodge City, 0.03; Trinidad, Col., 0.10; Edinburg, 0.11; Wellington, Kan., 0.14; Yates Centre, Kan., 0.19; Emporia, Kan., 0.21.

*Rainy Days.*—Rain (or melted snow) to the amount of 0.01 inch has fallen on an unusual number of days in the country at large. Such days generally numbered from 18 to 22 in the Lake region and Ohio valley; elsewhere from the Mississippi valley eastward from 12 to 18. On the Pacific coast from 10 to 14 in southern California, and 20 to 24 elsewhere. The stations reporting the smallest number of such days were Denver, Dodge City and Yuma, 2; Eagle Pass and Cheyenne, 4.

*Cloudy Days.*—The month has been marked by extreme cloudiness from the Mississippi valley eastward. The number of such days has generally varied in the Atlantic and Gulf States from 10 to 14; in Tennessee, the Ohio and Upper Mississippi valleys, from 14 to 18, and in the Lake region from 20 to 25. Regarding this, the following extracts from Signal Service Observers are noted: Little Rock, 2d, "sun seen for the first time since November 23d." Chicago, 27th, "sun first seen since the 14th." Detroit, 27th, "unbroken cloudiness since the 11th." Cleveland, 24th, "unbroken cloudiness since the 15th." Springfield, Ill., 24th, "eighth day without sunshine." Wellsboro, Pa., general cloudiness prevailed for 26 days—largest number reported. Buffalo, Oswego and Rochester each report 25 cloudy days. From Denver but one and from Yuma but two cloudy days were reported. On the Pacific slope from San Francisco northwards cloudiness prevailed from 20 to 25 days.

*Rain or Snow from a Cloudless Sky.*—Oregon, Mo., 12th; Cincinnati, 10th; Burlington, Vt., 10th; Springfield, Ill., 29th; Bangor, Me., 29th.

*Snow*—has fallen almost daily from the 6th, in New England, the Lake region and Upper Mississippi valley, and from the 18th in the Ohio and Missouri valleys and the Middle States; on the 20th, 21st, 26th and 29th, in the South Atlantic States; on the 19th, 20th, 22d, 28th, 29th and 31st, in the Gulf States; from the 2d to 5th, 8th, 24th, 28th and 29th, North Pacific region. The snowfall in the northwest districts though frequent was much lighter than usual. In the Atlantic States from

Connecticut to the northern half of North Carolina the snowfall was unusually large, ranging from two to three feet. The following special cases are noted: 28th, Green Springs, Ala., seven inches; Okalooska, La., one inch. 29th, Forsyth, Ga., four inches, heaviest fall since 1856; Atlanta, "one of the heaviest ever known;" Mobile; Montgomery, "five inches, very remarkable, heaviest ever known;" Columbus, Ga.,  $4\frac{1}{2}$  inches, "heaviest on record;" Augusta, Ga., "heaviest fall since 1857." 30th, New Orleans; El Paso, Tex.; Rockport, Tex.; three inches. 31st, Brownsville, Tex.; Fort Ringgold, Tex., two inches; Rio Grande City, 1.7 inches, first snow since December. 1866.

*Greatest Monthly Snow-falls.*—*California*: Summit, 62 inches; Truckee, 80; Emigrant Gap, 114; Cisco, 120. *Nevada*: Reno, Battle Mountain and Toano, 12; Winnemucca, 18. *Utah*: Blue Creek, Terrace and Corinne, 18. *Connecticut*: Mystic, 31. *Delaware*: Dover, 35. *Maryland*: Sandy Springs, most for 20 years; Deer Park, 35; Cumberland, 22. *Massachusetts*: Rowe and Somerset, 24; Fall River, 21. *Michigan*: Niles, 44. *New Hampshire*: Grafton, 28. *New Jersey*: Atco, 33; Freehold, 51; Vineland, 39. *North Carolina*: Highlands, 17. *Ohio*: College Hill, 24; North Lewisburg, 18. *Pennsylvania*: Philadelphia, 22; Fallsington, 21. *Virginia*: Dover Mines, 18; Mt. Solon, 28; Dover, 24.

*Snow on Ground at End of Month*—was reported from every station in New England, Middle States, Lake region, Tennessee, the Ohio, Missouri and Upper Mississippi valleys, in quantities generally ranging from 1 to 8 inches. The following special cases are noted: Brackettville and Rio Grande City, Tex., trace; El Paso and Brownsville Tex., 1 inch. Vicksburg, Miss. and Augusta, Ga.,  $\frac{1}{2}$  inch. Atlanta, Montgomery and Ft. Davis, Tex., 2. Charlotte, N. C., 8. Washington, 14. Helena, M. T., 23. Oswego, 24.

## RELATIVE HUMIDITY.

The relative humidity, not corrected for elevation, in the Atlantic and Gulf States, Tennessee, the Mississippi, Ohio and Lower Missouri valleys has generally ranged from 70 to 75 per cent.; in the Lake region from 76 to 83 per cent.; in northern California from 81 to 88 per cent.; in the Plateau district from 56 to 78 and Rocky Mountain districts from 49 to 63. The following percentages are noted as of interest: Cheyenne, 49; Pikes Peak, 61; Mt. Washington, 79; Indianola, 81; Cleveland, Escanaba and Grand Haven, 83; Duluth and Sacramento, 88; Bismarck, 89; St. Vincent, 91 and Chincoteague, 93.

## WINDS.

The prevailing winds during December, 1880, at Signal Service stations are shown on chart No. II, by arrows which fly with the wind. *Northwesterly* winds have prevailed in New England, Tennessee, the Middle and Gulf States and from the Mississippi valley westward to the Rocky Mountains. In the Lake region and the Ohio valley the winds were *southwesterly*. In other districts they were *variable*.

*Total Movements.*—The following were the *largest* in the *various* districts: Mt. Washington, 20.469 miles; Pike's Peak, 19.940; Cape May, 15.577; New Shoreham, 14.727; Sandy Hook, 13.665; Delaware Breakwater, 13.468; Thatcher's Island, 13.031; Cape Lookout, 12.637; Indianola, 11.361; Eastport, 10.393; Sandusky, 9.983; Milwaukee, 9.603. The *smallest* were: Phoenix, Ariz., 1.269 miles; La Mesilla, N. M., 1.532; Roseburg, Oregon, 2.127; Helena, Mont., 2.248; Visalia, Cal., 22.69; Augusta, Ga., 2.667; Lynchburg, 2.758; Castroville, Tex., 2.783; Deadwood, 3.072; Du-buque, 3.312; Boise City, 3.318.

*High Winds.*—Winds of 50 miles and above were observed as follows: on Mt. Washington from 1st to 7th, 10th, 12th to 17th, 26th to 28th, 30th, 31st; the highest wind was NW. 99 miles on the 30th and from other points S. 80 on the 5th and E. 70 on 26th; on Pikes Peak, from 1st to 7th, 12th to 14th, 23rd to 27th, with a maximum of NW. 78 on the 6th; Fort Benton, W. 50 on the 12th; Portsmouth, SE. 50 on the 20th; Kittyhawk, NE. 50 on the 9th; Indianola, N. 51 28th and 29th; Cape May, NW. 52 on the 30th; Milwaukee, SW. 53 on the 5th; Yankton, NW. 56 on the 5th; Chincoteague, NE. 60 on the 20th; Cape Henry, NE. and NW. 60 on the 20th and 28th respectively; Barnegat, NE. 62 on the 26th; New Shoreham, NE. 64 on the 26th; Thatcher's Island, E. 84 on the 26th.

*Local Storms.*—The following tornadoes on the 4th were reported by the Missouri Weather Service and the voluntary observers of the Signal Service in that section: Between the hours of 7 and 8 p. m., three comparatively violent tornadoes, pursuing nearly parallel paths to the northeastward, occurred in southwestern Missouri in connection with the passage of low-pressure area No. III. The track of the one farthest north passed near the towns of Sarcxie, Lawrenceburg and Ash Grove, destroying five buildings and causing much damage to other property. The second storm passing near Pierce City, visited the towns of Verona, Brookline, Springfield and Marshfield. Eleven buildings were either unroofed or torn to pieces and several animals killed, besides which, much other damage was done to fences, haystacks and farm machinery. Width of storm-path about 300 yards. The third storm passed through portions of Barry, Stone, Christain and Webster counties, visiting the town of Ozark. Several buildings were wrecked and considerable damage done.